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BAKER (MICHAEL) JR INC BEAVER PA F/G 13/13  
NATIONAL DAM SAFETY PROGRAM, LITTLE CREEK RESERVOIR DAM (INVENT--ETC(U)  
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## **JAMES RIVER BASIN**

**Name of Dam: Little Creek Reservoir Dam**

**Location: James City County, Commonwealth of Virginia**

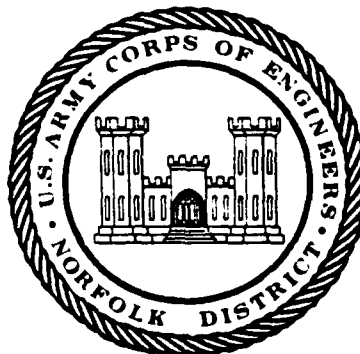
**Inventory Number: VA 09506**



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# **PHASE I INSPECTION REPORT**

## **NATIONAL DAM SAFETY PROGRAM**



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### **PREPARED FOR**

**NORFOLK DISTRICT CORPS OF ENGINEERS  
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NORFOLK, VIRGINIA 23510**

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**February 1981**

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. <b>AD-A103515</b>	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Inspection Report National Dam Safety Program		5. TYPE OF REPORT & PERIOD COVERED <b>Final</b>
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Michael Baker, Jr., Inc. Beaver, Penn 150009		8. CONTRACT OR GRANT NUMBER(s) <b>DACW 65-80-D-0032</b>
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineering District 803 Front Street Norfolk, Virginia 23510		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS <b>7-150</b>
11. CONTROLLING OFFICE NAME AND ADDRESS National Dam Safety Program. Little Creek Reservoir Dam (Inventory Number VA-09506), James River Basin, James City County, Commonwealth of Virginia. Phase I Inspection Report.		12. REPORT DATE <b>February 1981</b>
14. MONITOR		13. NUMBER OF PAGES
		15. SECURITY CLASS. (of this report)  <b>Unclassified</b>
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report)  <b>Approved for public release; distribution unlimited</b>		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dams - VA National Dam Safety Program Phase I Dam Safety Dam Inspection		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  <b>41 12</b>		

## 20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Inspection is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspection. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate

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## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the design flood should not be interpreted as necessarily posing a highly inadequate condition. The design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM

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NAME OF DAM: LITTLE CREEK RESERVOIR DAM

PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Little Creek Reservoir Dam  
State: Commonwealth of Virginia  
County: James City  
USGS 7.5 Minute Quadrangle: Norge, Virginia and Toano,  
Virginia  
Stream: Little Creek  
Date of Inspection: 13 November 1980

BRIEF ASSESSMENT OF DAM

Little Creek Reservoir Dam is an earthfill embankment 67.0 feet high<sup>1</sup> and approximately 1,900 feet long. The dam has a drop-inlet spillway consisting of a 13 foot by 18 foot concrete riser with a 6 foot diameter concrete outlet pipe. The dam, located near Toano, Virginia, is used for water supply by the City of Newport News, Virginia. The dam is owned by the City of Newport News, Virginia. Little Creek Reservoir Dam is an "intermediate" size - "significant" hazard structure as defined by the Recommended Guidelines for Safety Inspections of Dams. The dam and appurtenant structures were found to be generally in good overall condition. Visual inspection and office analyses indicate deficiencies requiring remedial treatment. A stability check is not required.

Using the Corps of Engineers' screening criteria for initial review of spillway adequacy, the Probable Maximum Flood (PMF) was selected as the spillway design flood (SDF) for Little Creek Reservoir Dam. The spillway is capable of passing up to 88 percent of the PMF without overtopping the dam. Despite the inability of the spillway to pass the SDF, the depth, duration, and rate of overtopping flows are not considered detrimental to the embankment. The spillway is adjudged as inadequate.

A regular program of inspections should be made of the dam and appurtenant structures. A thorough check list should be compiled for use by the owner's representative as a guide for the inspections. A check of the observation wells and the flow from the embankment drains should be included in the inspection check list. Maintenance items should be completed annually.

<sup>1</sup>Measured from the streambed at the downstream toe of the dam to the lowest point on the embankment crest.

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

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Normal loading conditions had not yet been experienced by the dam at the time of the inspection. It is recommended that the dam be reinspected after normal loading conditions are reached.

A formal warning system and emergency action plan should be developed and implemented as soon as possible.

The following repair items should be accomplished as part of the general maintenance of the dam:

- 1) Establish a good grass cover over the entire embankment.
- 2) Add riprap to the area at the base of the concrete chute draining the junction of the downstream embankment and the left abutment.
- 3) Install a staff gage to monitor reservoir levels above normal pool.


MICHAEL BAKER, JR., INC.

SUBMITTED:

Original signed by

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Chief, Design Branch

  
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Original signed by:

Douglas L. Haller

Douglas L. Haller  
Colonel, Corps of Engineers  
District Engineer



Date: \_\_\_\_\_

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NAME OF DAM: LITTLE CREEK RESERVOIR DAM

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OVERALL VIEW OF DAM

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PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM  
NAME OF DAM: LITTLE CREEK RESERVOIR DAM ID# VA 09506

SECTION 1 - PROJECT INFORMATION

1.1 General

1.1.1 Authority: Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of safety inspections of dams throughout the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams (Reference 12, Appendix IV). The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Description of Project

1.2.1 Description of Dam and Appurtenances: Little Creek Reservoir Dam is an earthfill embankment 67.0 feet high and approximately 1,900 feet long. The upstream embankment is entirely riprapped (Photo 3) and has a slope of approximately 3.2H:1V (Horizontal to Vertical). The downstream embankment is sparsely grass covered (Photo 4) and has three approximately 12 foot wide benches below the crest at elevations 49.2, 31.4, and 13.8 feet above Mean Sea Level (M.S.L.), respectively. The entire toe of the downstream embankment is riprapped to protect against erosion during periods of high tailwater (Photo 2). The downstream embankment slopes are approximately 3.0H:1V. The crest of the embankment is at elevation 67.0 feet M.S.L. and is 48 feet wide. Relocated Virginia Route 631, a two-lane asphalt roadway, runs along the crest of the dam.

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

The spillway is located just to the left of the center of the embankment (Photo 3). The intake structure is a rectangular, concrete drop spillway riser. The inside dimensions of the drop spillway are 13.0 feet by 18.0 feet. There are four inlets to the riser, two - 4 feet by 4.5 feet and two - 12 feet by 4.5 feet. All inlets are fitted with trash screens. The crests of the weirs for all four inlets are at elevation 60.0 feet M.S.L. The total weir length for all four inlets is 32 feet. Water flowing over these weirs drops 60 feet into a sump type stilling basin at elevation 0.0 feet M.S.L. The water then flows into a 72 inch diameter concrete outlet pipe. The invert of the outlet pipe is at elevation 5.4 feet M.S.L. This leaves a residual pool of water in the stilling basin approximately 5.4 feet deep. The outlet pipe is 270 feet long with a slope of 0.5 percent and discharges into a concrete impact basin (Photo 2). Flow is directed against a concrete baffle with two roughly triangular openings for energy dissipation and then over a 30 foot wide end sill. The crest elevation of the end sill is at 3.5 feet M.S.L.

The reservoir can be drained by means of a 48 inch diameter sluice gate set in the upstream wall of the riser. A 48 inch diameter reinforced concrete pipe leads to the sluice gate from a concrete intake structure. There is a 12 inch diameter sluice gate tapped off the 48 inch diameter pipe at elevation 6.5 feet M.S.L. There are two additional 12 inch diameter sluice gates, one at elevation 30.0 feet M.S.L. and one at elevation 48.0 feet M.S.L. Little Creek Reservoir Dam is equipped with probes for monitoring the discharge temperature and the downstream dissolved oxygen.

A gatehouse sits atop the spillway riser. A concrete footbridge connects the gatehouse with the crest of the dam. Operating controls for the sluice gates, monitors for the temperature and dissolved oxygen probes, and access hatches to the spillway are located in the gatehouse.

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

- 1.2.2 Location: Little Creek Reservoir Dam is located in James City County about 3.5 miles southwest of Toano, Virginia on Virginia Route 631. The dam is situated on Little Creek, about 3.0 miles upstream from the Chickahominy River. A Location Plan is included with this report in Appendix I.
- 1.2.3 Size Classification: The height of the dam is 67.0 feet. The reservoir storage capacity at the crest of the dam (elevation 67.0 feet M.S.L.) is 32,143 acre-feet. Therefore, Little Creek Reservoir Dam is in the "intermediate" size category as defined by the Recommended Guidelines for Safety Inspection of Dams.
- 1.2.4 Hazard Classification: Virginia Route 631, a two-lane asphalt highway, runs along the crest of Little Creek Reservoir Dam. One home is situated approximately 0.2 miles downstream of the dam and another home is approximately 0.9 miles downstream. Therefore, Little Creek Reservoir Dam is considered in the "significant" hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams. The hazard classification used to categorize dams is a function of location only and is not related to its stability or probability of failure.
- 1.2.5 Ownership: Little Creek Reservoir Dam is owned by the City of Newport News, 2400 Washington Avenue, Newport News, Virginia 23607. The right of way for Virginia Route 631 is owned by the Virginia Department of Highways and Transportation.
- 1.2.6 Purpose of Dam: Little Creek Reservoir Dam is used for water supply by the City of Newport News and for recreational purposes.
- 1.2.7 Design and Construction History: Little Creek Reservoir Dam was designed in September, 1975 by Malcolm Pirnie Engineers, Inc. of Newport News, Virginia. The dam was constructed by Excavation Construction, Inc., and Suburban Grading and Utilities. Construction of the dam was substantially completed in the spring of 1980. At the time of inspection, certain minor items remained to be completed.

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

- 1.2.8 Normal Operational Procedures: The reservoir is normally operated at the elevation of the spillway weir crest, 60.0 feet M.S.L. The level of the reservoir can be controlled through the use of the 12 inch and 48 inch sluice gates (as described in Section 1.2.1). No formal operating procedures were available for review.

1.3 Pertinent Data

- 1.3.1 Drainage Area: The reservoir is fed by Little Creek and several small unnamed streams. The watershed encompasses approximately 4.6 square miles to the north and east of the dam.

- 1.3.2 Discharge at Dam Site: The maximum discharge from the reservoir is unknown, but there have been no large discharges. The reservoir is currently being filled for the first time. .

Spillway:

Pool level at top of dam . . . 1042 c.f.s.

- 1.3.3 Dam and Reservoir Data: Pertinent data on the dam and reservoir are shown in the following table:

TABLE 1.1 DAM AND RESERVOIR DATA

Item	Elevation (feet)	Area (acres)	Reservoir Capacity		Length (feet)
			Acre- feet	Watershed (inches)	
Top of dam (minimum)	67.0	1,172	32,100	131.3	16,400
Spillway crest	60.0	996	24,600	100.3	16,200
Streambed at toe	0.0	-	-	-	-

NAME OF DAM: LITTLE CREEK RESERVOIR DAM



## SECTION 2 - ENGINEERING DATA

- 2.1 Design: Design plans for Little Creek Reservoir Dam were provided by representatives of the City of Newport News. Specifications and boring logs were not available for use in preparing this report. No stability analyses or hydrologic and hydraulic data were available for review.
- 2.2 Construction: Construction records, as-built plans, and inspection logs were not available for review.
- 2.3 Evaluation: No construction records or as-built plans were available to adequately assess the condition of the dam. All evaluations and assessments in this report were based on field observations, discussions with the owner's representatives, and office analyses.

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

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## SECTION 3 - VISUAL INSPECTION

### 3.1 Findings

3.1.1 General: The field inspection was conducted on 13 November 1980. At the time of the inspection, the pool elevation was 25.7 feet M.S.L. and the elevation of the tailwater was 0.9 feet M.S.L. The weather was clear and the temperature was 65 degrees Fahrenheit. The ground surface at the embankment and the abutments was generally dry. The dam and appurtenant structures at the time of inspection were found to be in generally good overall condition, although deficiencies found during the inspection will require remedial treatment. The complete visual check list is given in Appendix III. No record of any previous inspections was found.

3.1.2 Dam: The embankment was found to be in generally good overall condition. The upstream embankment is entirely covered with riprap (Photo 3). The riprap consists of angular rocks approximately one foot in diameter. The junctions of the embankment and the abutments contain paved concrete chutes (Photo 6). The left upstream abutment is badly eroded below the chute (Photo 5). There is insufficient riprap at the outlet of the left downstream chute (Photo 6). The downstream embankment is slightly eroded and sparsely covered with grass. Local mulching and reseeding has been conducted recently. A very minor slump is located on the far right downstream embankment between the upper and middle benches. Jute matting has been used in the area of the concrete chutes on the downstream side of the dam to prevent erosion while vegetation is established. The entire downstream toe has been riprapped.

Three 8 inch diameter drainage filter outlets (Photo 7) are present along the downstream toe, one to the left and two to the right of the spillway outlet. Flow was observed from all three drain outlets; total flow was approximately 1.7 gallons per minute. There are five 12 inch diameter bench drain outlets,

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

two to the left of the spillway outlet and three to the right. No flow was observed from any of the bench drains.

3.1.3 Appurtenant Structures: The intake structure for the spillway (as described in Section 1.2.1) is in good condition. The inlets are fitted with adequate trash racks. The concrete outlet conduit and impact basin (as described in Section 1.2.1) are in good condition with no cracking or spalling. The discharge area below the outlet is heavily riprapped. All gates for the emergency drain and water quality control are in good condition.

3.1.4 Reservoir Area: The area upstream of the dam has been cleared and grubbed to an elevation several feet above the normal pool elevation. Moderate to severe erosion has occurred in the cleared areas. Beyond the limits of the clearing and grubbing, the reservoir slopes are wooded, with no evidence of erosion. Erosion of the lower reservoir slopes has caused some sedimentation to occur. The extent of sedimentation was not directly observed.

3.1.5 Downstream Channel: The downstream channel is wide and unobstructed. The stream is subject to tidal influences immediately downstream of the dam. The Chickahominy River is approximately 3.0 miles downstream of the dam. There is no appreciable slope to the downstream channel. The overbank areas are covered with tall grass, reeds and brush.

3.1.6 Instrumentation: There are single observation wells located near the center of the dam on the upstream and downstream edges of the crest, and on the upper and middle benches of the downstream embankment. A total of four observation wells was found during the inspection.

Removable, 2-inch deep, V-notch weirs are present in the 8 inch diameter drainage filter outlets (Photo 7).

3.2 Evaluation: At the time of inspection, the reservoir was being filled for the first time. The pool elevation was at 25.7 feet M.S.L. When filled, normal pool

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

will be at the crest of the spillway, elevation 60.0 feet M.S.L. The erosion below the concrete chute at the junction of the upstream embankment and the left abutment will be inundated when the reservoir reaches normal pool level, and should not require remedial treatment. The concrete chutes and the riprap on the upstream embankment are in good condition. A grass cover should be established over the entire embankment. The establishment of a good grass cover should stabilize the slight erosion and minor slump on the downstream embankment. Additional riprap is needed at the base of the concrete chute draining the junction of the downstream embankment with the left abutment to minimize erosion.

When the reservoir reaches normal pool, the sedimentation caused by the clearing and grubbing of the reservoir area should diminish.

A regular program should be established to monitor the observation wells and the flow from the drain outlets.

A staff gage should be installed to monitor reservoir levels above normal pool.

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

## SECTION 4 - OPERATIONAL PROCEDURES

- 4.1 Procedures: The operation of the dam is primarily an automatic function controlled by the crest of the spillway. Water entering the reservoir flows through the spillway at elevation 60.0 feet M.S.L. The dam is equipped with two 12 inch sluice gates and one 12 inch gate valve for water quality control, and one 48 inch sluice gate for draining the reservoir. Some control of the discharge from the reservoir can be exercised through the operation of these gates and valve. No operational procedures were available for review in preparing this report.
- 4.2 Maintenance of Dam: Little Creek Reservoir Dam is a new dam. At the time of inspection, the reservoir was being filled for the first time. The designer/builder is still exercising some control over the maintenance of the dam. During this transitional period, responsibility for maintenance is being shared between the owner and the designer/builder. Eventually, the maintenance of the dam will be the sole responsibility of the owner.
- 4.3 Maintenance of Operating Facilities: As described in Section 4.2, the maintenance of the operating facilities is now being shared, but will eventually become the sole responsibility of the owner. A regular inspection or maintenance schedule has not been instituted.
- 4.4 Warning System: At the present time, no warning system or emergency action plan has been instituted.
- 4.5 Evaluation: A regular program of inspection and maintenance should be instituted. A check list should be compiled for use by the owner's representative as a guide for the inspections. Maintenance items should be corrected annually and documented. A warning system or emergency action plan should be developed and implemented as soon as possible.

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

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## SECTION 5 - HYDRAULIC/HYDROLOGIC DATA

- 5.1 Design: No hydraulic or hydrologic design data were available for use in preparing this report.
- 5.2 Hydrologic Information: No rainfall, stream gage, or reservoir stage records are maintained for this dam.
- 5.3 Flood Experience: No records were available.
- 5.4 Flood Potential: The Probable Maximum Flood (PMF) and the 1/2 Probable Maximum Flood (1/2 PMF) were developed and routed through the reservoir by use of the HEC-1 DB computer program (Reference 9, Appendix IV) and appropriate unit hydrograph, precipitation and storage-outflow data. Clark's  $T_c$  and R coefficients for the local drainage areas were estimated from basin characteristics. The rainfall applied to the unit hydrograph was taken from a publication by the National Oceanic and Atmospheric Administration (Reference 17, Appendix IV). Rainfall losses for the PMF were estimated at an initial loss of 1.0 inch and a constant loss rate of 0.05 inches per hour thereafter.
- 5.5 Reservoir Regulation: Pertinent dam and reservoir data are shown in Table 1.1, paragraph 1.3.3.

Regulation of flow from the reservoir is primarily an automatic function. Normal flows are maintained by the crest of the spillway riser at elevation 60.0 feet M.S.L. Some flow regulation can be exercised by the operation of the sluice gates and gate valve described in Section 1.2.1. There is no emergency spillway.

The outlet discharge was computed by hand; reservoir area was planimetered from the Norge, Virginia and the Toano, Virginia, 7.5 minute USGS quadrangles; storage capacity was computed by the HEC-1 DB program. Outlet discharge capacity and storage capacity curves were computed to elevations above the crest of the dam. All flood routings were begun with the reservoir at normal pool.

- 5.6 Overtopping Potential: The probable rise of the reservoir and other pertinent information on the reservoir performance are shown in the following table:

NAME OF DAM: LITTLE CREEK RESERVOIR DAM



TABLE 5.1 RESERVOIR PERFORMANCE

Item	Normal <sup>1</sup>	Hydrograph	
		1/2 PMF	PMF <sup>2</sup>
Peak flow, c.f.s.			
Inflow	5	27,007	54,014
Outflow	5	909	4,121
Peak elev., ft. M.S.L.	60.02	64.2	67.7
Non-overflow section <sup>3</sup> (elev. 67.0 ft. M.S.L.)			
Depth of flow, ft.			0.7
Average velocity, f.p.s.			3.9
Total duration of over- topping, hrs.			9.3
Tailwater elev., ft. T.B.M.	0.9		-

<sup>1</sup>Conditions at time of inspection.

<sup>2</sup>The PMF is an estimate of flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in a region.

<sup>3</sup>Velocity estimates were based on critical depth at control section.

5.7 Reservoir Emptying Potential: The reservoir can be drawn down by means of a 48 inch sluice gate set in the upstream side of the riser. Neglecting inflow, the reservoir can be drawn down from normal pool in approximately 53.0 days with the gate completely open. This is equivalent to an approximate drawdown rate of 1.0 feet per day, based on the hydraulic height measured from normal pool divided by the time to dewater the reservoir. The drawdown rate can be controlled; part of the owner's operating plan is to allow a maximum drawdown rate of 0.5 feet per day.

5.8 Evaluation: Little Creek Reservoir Dam is an "intermediate" size - "significant" hazard dam requiring evaluation for a spillway design flood (SDF) in the range between the 1/2 PMF and the PMF, according to the Recommended Guidelines for Safety Inspection of Dams. Due to the risk involved, the PMF was selected as the SDF. The PMF was routed through the dam and found to overtop the dam by a maximum depth of 0.7 feet with an average critical velocity of 3.9 feet per second (f.p.s.). Total duration of dam overtopping would be 9.3 hours. The spillway is capable of passing up to 88 percent of the PMF without overtopping the dam.

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

Conclusions pertain to present-day conditions and the effect of future development on the hydrology has not been considered.

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

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## SECTION 6 - DAM STABILITY

6.1 Foundation and Abutments: Previous information describing local subsurface conditions was not available for the visual inspection or later analysis and inclusion in this report. The dam is located in the Coastal Plain physiographic province of Virginia. The topography consists of low hills with steep side slopes and relief of between 100 to 250 feet. The Yorktown formation, Tertiary age, is shown on the State Geologic map as underlying the dam and comprising the abutments. The formation reportedly consists of coquina, and unconsolidated sand and clay. Sandy soils were observed on the cleared abutments during the visual inspection.

### 6.2 Embankment

6.2.1 Materials: No information describing the nature or zoning of the embankment materials was available at the time of preparation of this report. The embankment appeared to be constructed of clayey to silty fine sand (ML group soil-Unified Classification System) during the visual inspection. The embankment is assumed to be generally homogeneous.

6.2.2 Stability: Design plans were available for review during this evaluation. However, the results of previous stability analyses and other supportive data were unavailable for review and discussion in this report. The upstream embankment slope is shown on the design plans as 3H:1V. The field measured slope was 3.2H:1V. The downstream embankment slope is also shown as 3H:1V, interrupted by three 10 foot wide, reverse benches. This was generally confirmed during the field survey. The design crest width is 40 feet, but was measured as being 48 feet during the visual inspection.

A seepage cutoff trench was excavated, according to the design plans, to stabilize the structure. It runs approximately 30 feet deep along the upstream toe of the dam, through the natural valley and up the abutments to elevation 10 feet M.S.L. In addition, a drainage filter system was constructed beneath and in the downstream embankment to

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

intercept any seepage still occurring beneath or through the dam and to maintain the resulting phreatic surface at an acceptable level.

Calculations made as a part of this investigation indicate that the dam is subject to a rapid drawdown since the reservoir will drop 1 foot per day with the sluice gate completely open. This exceeds the critical rate for earth dams of 0.5 feet per day.

Signs of instability in the dam such as slumping, tension cracks, or unusual alignment along the crest were generally absent during the visual inspection. One minor slump was observed on the far right downstream embankment between the upper and middle benches, but is not considered significant. During the field inspection, measurements were taken in four observation wells on the dam. The water levels were 17 feet below the partial pool elevation of 25.7 feet. An inadequate vegetative cover was present on the downstream embankment (Photo 4).

- 6.3 Seismic Stability: The dam is located in Seismic Zone 1 which presents no hazard from earthquakes according to the Recommended Guidelines for the Safety Inspection of Dams by the Department of the Army, Office of the Chief of Engineers. This determination is contingent on the requirements that static stability conditions are satisfactory and conventional safety margins exist.
- 6.3 Evaluation: The results of a previous stability analysis and other supportive data were not available for this evaluation of Little Creek Reservoir Dam. No evidence of any stability problems was discovered during the visual inspection. A stability check is not required.

Despite the inability of the spillway to pass the SDF (as described in Section 5.8), the depth, duration and rate of overtopping flows are not considered detrimental to the embankment. Overtopping flows are shallow and last only 9.3 hours, and the velocity is less than 6 f.p.s., the effective eroding velocity for a vegetated earth embankment.

Normal loading conditions had not yet been experienced by the dam at the time of the inspection. It is recommended that the dam be reinspected after normal loading conditions are reached.

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

## SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

- 7.1 Dam Assessment: The design data available were adequate for review. Little Creek Reservoir Dam is a new dam; the reservoir is currently being filled for the first time. Normal loading conditions had not yet been experienced by the dam at the time of the inspection. No construction data or hydraulic/ hydrologic information were available for use in preparing this report. No indication of any stability problems was discovered during the field inspection and office analyses. The dam and appurtenant structures were found to be generally in good overall condition. No regular program of inspection and maintenance has been instituted. A stability check is not required.

Using the Corps of Engineers' screening criteria for initial review of spillway adequacy, the PMF was selected as the SDF for the "intermediate" size - "significant" hazard Little Creek Reservoir Dam. The spillway is capable of passing up to 88 percent of the PMF without overtopping the dam. Despite the inability of the spillway to pass the SDF (as described in Section 5.8), the depth, duration, and rate of overtopping flows are not considered detrimental to the embankment. The spillway is adjudged as inadequate, but not seriously inadequate.

There is no flood warning system or emergency action plan currently in operation.

- 7.2 Recommended Remedial Measures: A regular program of inspections of the dam and appurtenant structures should be instituted. A thorough check list should be compiled for use by the owner's representative as a guide for the inspections. A check of the observation wells and the flow from the seepage drains should be included in the inspection check list. Maintenance items should be completed annually.

It is recommended that the dam be reinspected after normal loading conditions are reached.

A warning system and emergency action plan should be developed and implemented as soon as possible.

The following repair items should be accomplished as part of the general maintenance of the dam:

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

- 1) Establish a good grass cover over the entire embankment.
- 2) Add riprap to the area at the base of the concrete chute draining the junction of the downstream embankment and the left abutment.
- 3) Install a staff gage to monitor reservoir levels above normal pool.

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

APPENDIX I

PLATES



BIANT

## CONTENTS

Location Plan

Plate 1: Plan and Profile of Dam

Plate 2: Sections of Dam

Plate 3: Overflow Conduit - Plan and Profile of Drainage Filter

Plate 4: Drainage Plan, Plans, Sections and Details

Plate 5: Drop Spillway Plans and Details

Plate 6: Drop Spillway Sections and Details

Plate 7: Inlet Piping and Drainage Filter Plans, Sections, and Details

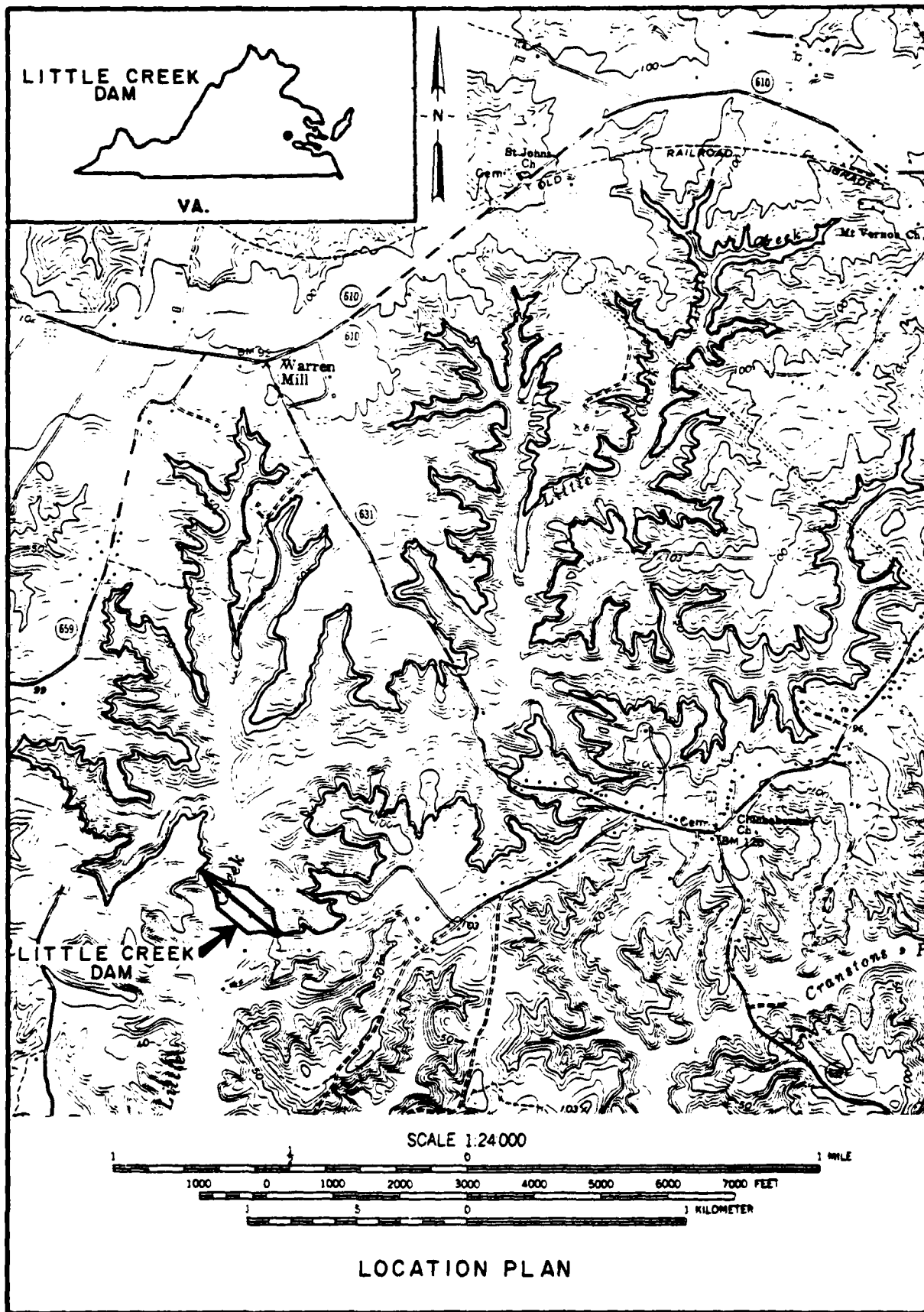
Plate 8: Outlet Basin Plans and Section

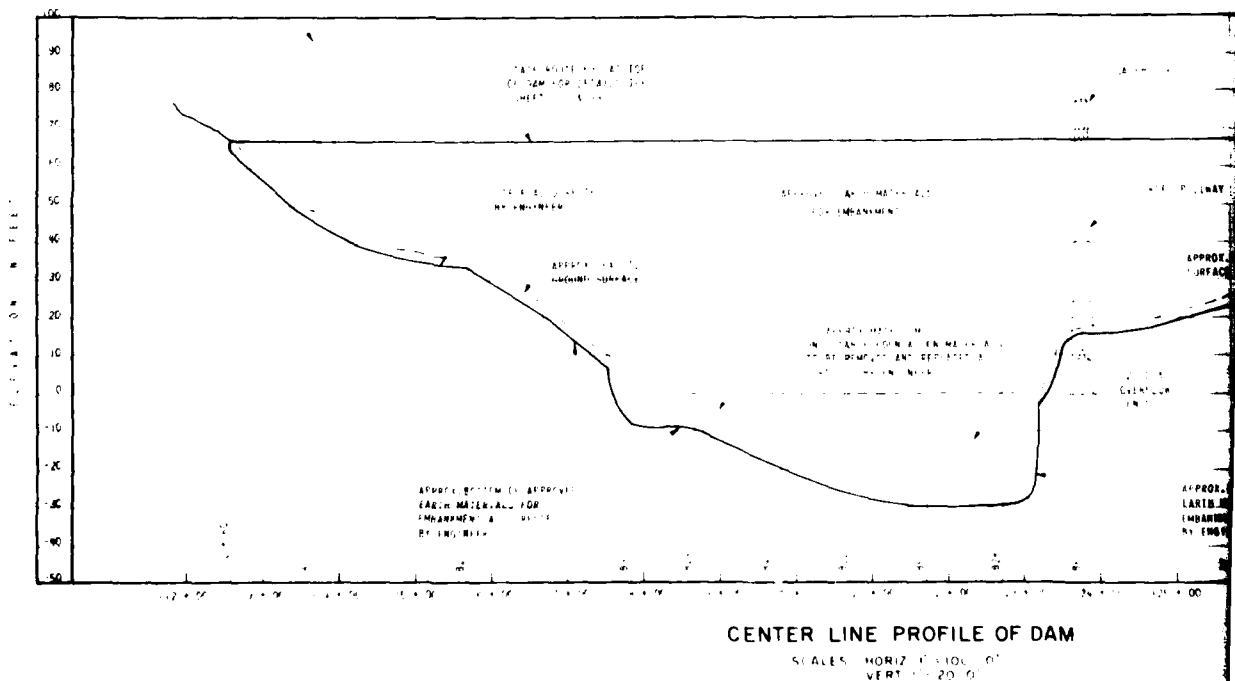
Plate 9: Miscellaneous Sections and Details

Plate 10: Top of Dam Profile

Plate 11: Typical Dam Cross Section

NAME OF DAM: LITTLE CREEK RESERVOIR DAM





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BIRNIE  
ENGINEERS, INC.**

DESIGNED RED DRAWN " CHECKED 4 11/11  
REVISIONS

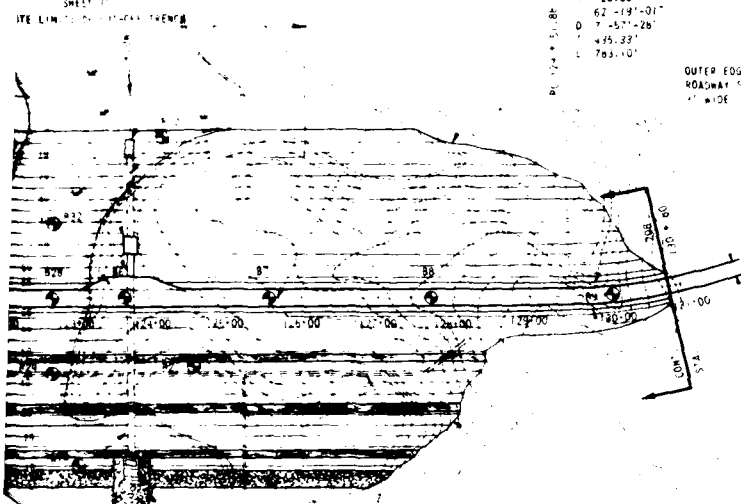
CITY OF NEWPORT NEWS, VIRGINIA DEPARTMENT  
WATER SYSTEM IMPROVEMENTS  
EARTHFILL DAM  
CONTRACT 20B

UPSTREAM TOE OF  
EMBANKMENT AND  
LIMIT OF RIPRAP

48" DIA. RESERVOIR DRAIN  
AND CHADLE. 12" PIPES  
NOT SHOWN. FOR DETAILS  
SEE SHEET 5

E CURVE DATA  
R 720.00'  
D 7 - 57' - 01"  
L 435.33'  
E 783.10'

OUTER EDGE OF  
ROADWAY SHOULDER.  
4' WIDE

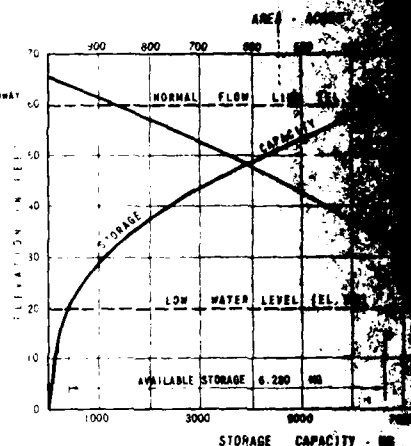


22" WIDE PAVED ROAD  
FOR STATE ROUTE - 31  
RELOCATION

OUTER EDGE OF  
ROADWAY SHOULD BE  
4' WIDE

DOWN, 'REAM FOR  
OF EMBARKMENT

FOR DETAILS, SEE SHEET 1

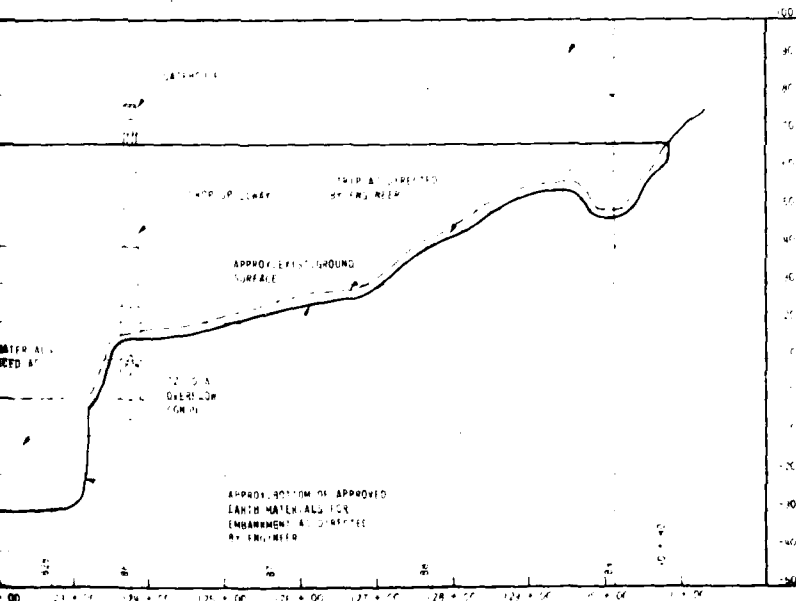


### AREA-CAPACITY CURVE

100'-0"

2. 1079 P. 2. 1081

MC 100 • 2011 • 2011 • 2011



00' - 0"

NEWS, VIRGINIA DEPARTMENT OF PUBLIC UTILITIES

## SYSTEM IMPROVEMENTS

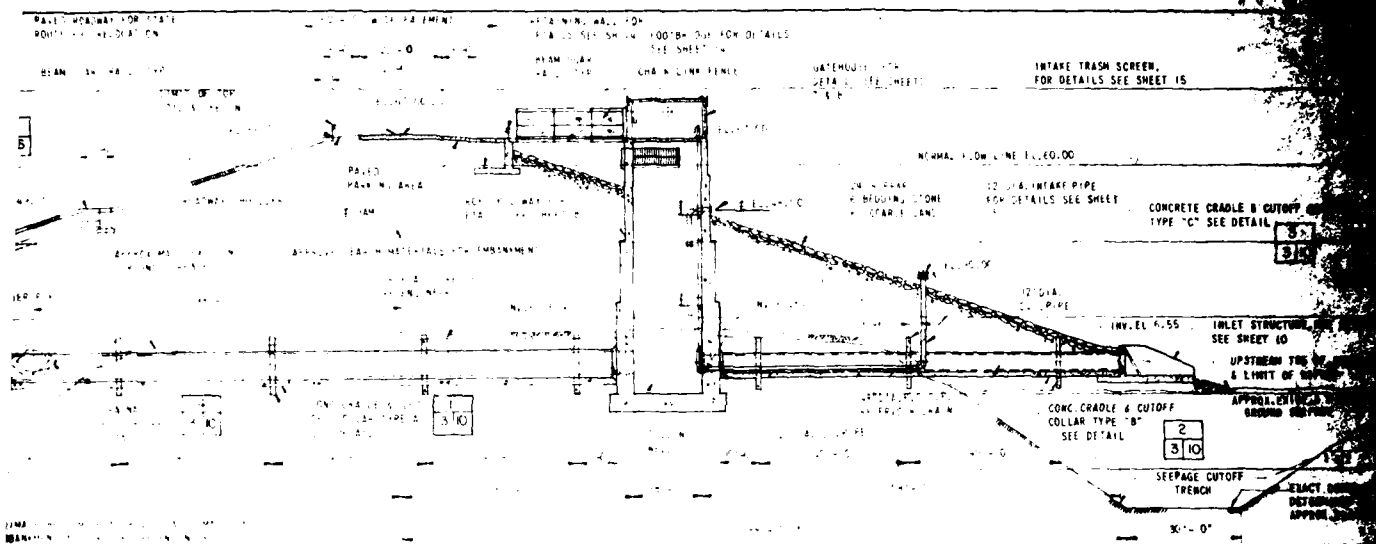
### EARTHFILL DAM

CONTRACT 208

## PLAN AND PROFILE OF DAM

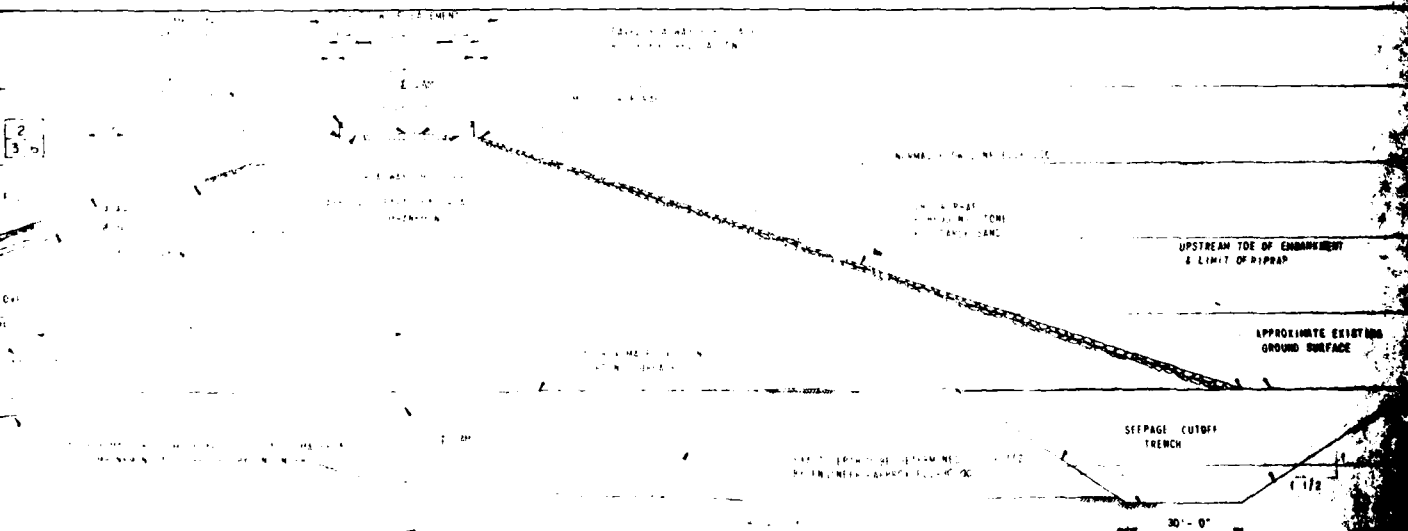
SCALE AS NOTED





SECTION - STA. 123 + 75

- NOTES:
1. DETAILS OF TOP OF DAM (INCLUDING PAVEMENT) AND SHOULDERS ARE SHOWN ON SHEET 12.
  2. PROFILE OF DRAINAGE FILTER IS SHOWN ON SHEET 1.
  3. EARTH FILL EMBANKMENT SHALL BE COMPACTED TO GRADE SHOWN.
  4. UNSUITABLE FOUNDATION MATERIALS TO BE DISPOSED UPSTREAM OF DAM IN LOCATION SHOWN ON SHEET 1.



SECTION - STA. 122 + 66

IN ALL TABLES, UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN FEET AND INCHES. DIMENSIONS ARE TO BE MAINTAINED AS SHOWN ON THIS DRAWING.

PLATE

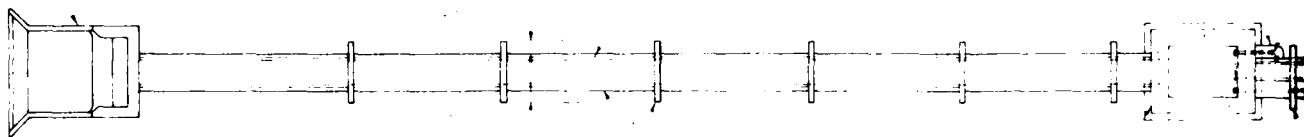
AT NEWSP, VIRGINIA DEPARTMENT OF PUBLIC UTILITIES  
 ER SYSTEM IMPROVEMENTS  
 EARTHFILL DAM  
 CONTRACT 20B

## SECTIONS OF DAM

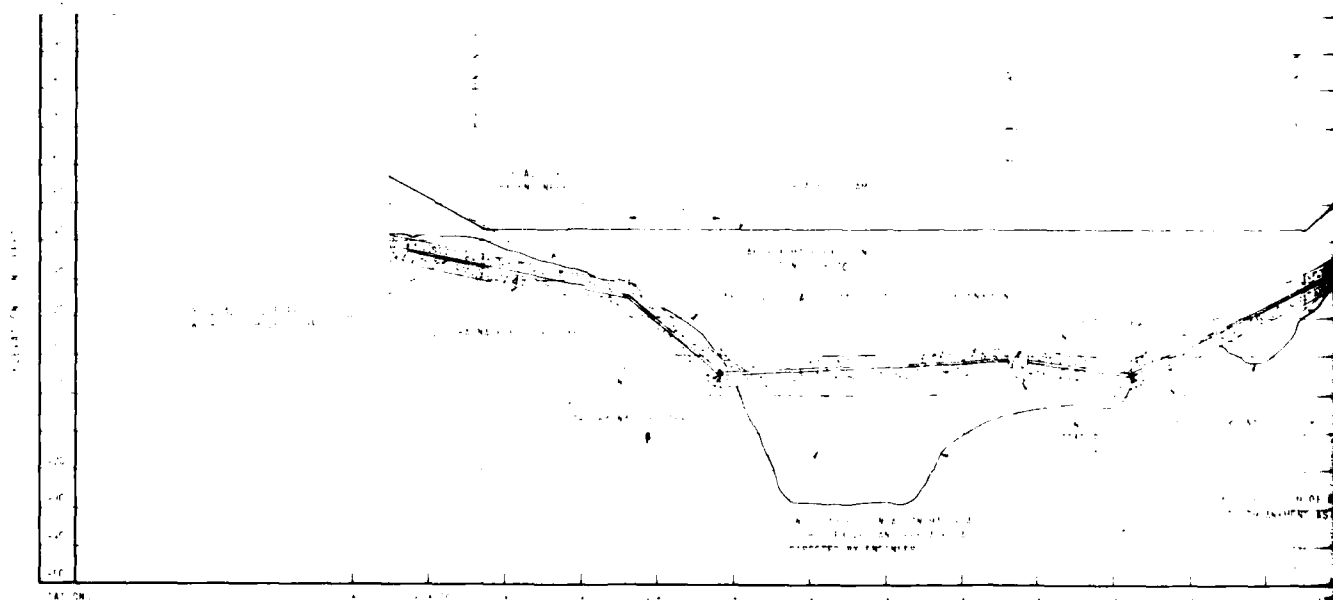
SCALES HOR. " = 20' - 0", VERT. " = 20' - 0"

12

OUTLET BAY WITH  
DETAIL SHEET



OVERFLOW CONDUIT PLAN  
SCALE 1"=20'



PROFILE OF DRAINAGE FILTER  
SCALE 1"=20'

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ENGINEERS, INC.**

DESIGNED **KED** DRAWN **W. H. H.** CHECKED **R. S.**  
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**WATER SYSTEM IMPROVEMENTS**  
**EARTHFILL DAM**  
CONTRACT 208



SECTION A-A  
SCALE 1" = 10'

E 34

SECTION B-B  
SCALE 1" = 10'

SECTION C-C  
SCALE 1" = 10'

SECTION D-D  
SCALE 1" = 10'

SECTION E-E  
SCALE 1" = 10'

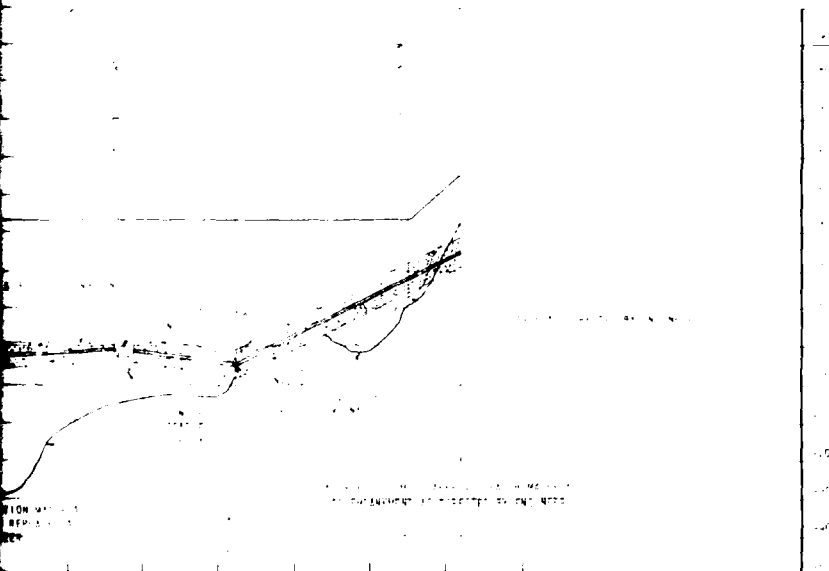
SECTION F-F  
SCALE 1" = 10'

NOTES: 1. SEE

SECTION G-G  
SCALE 1" = 10'

SECTION H-H  
SCALE 1" = 10'

CONDUIT PLAN



NOTES: 1. LOCATION OF DAM, GATEHOUSE AND  
ON PROFILE OF DRAINAGE FILTER  
2. ELEVATIONS ARE BASED ON  
3. ELEVATIONS SHOWN ARE PRELIMINARY  
ON SHEET 10  
4. SEE DRAINAGE PLAN OF DAM  
5. SEE TABLE FOUNDATION  
6. SEE PLAN OF DAM IN LOCATION

DRAINAGE FILTER

100  
20

NEWSPAPER, VIRGINIA DEPARTMENT OF PUBLIC UTILITIES

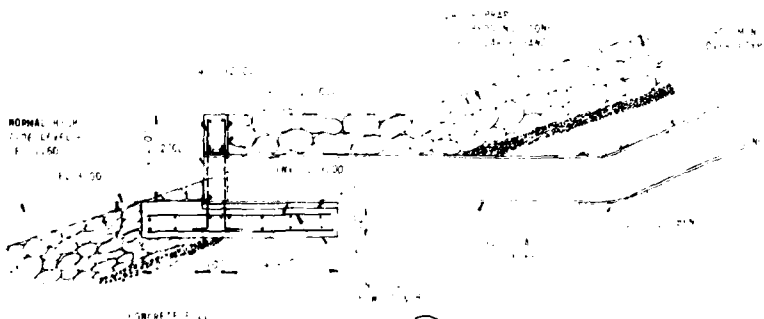
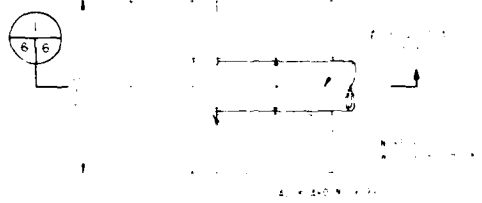
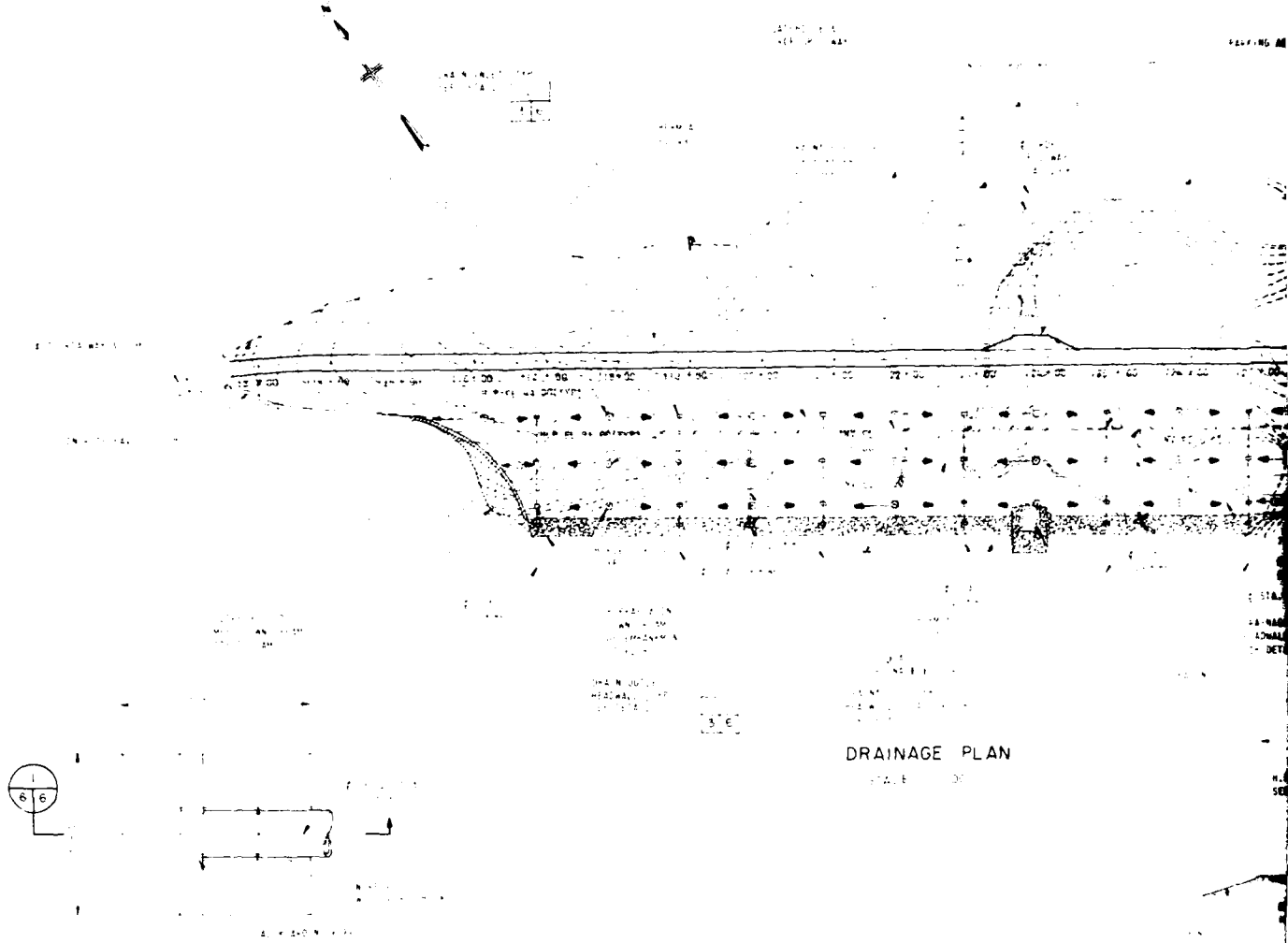
WATER SYSTEM IMPROVEMENTS

EARTHFILL DAM

CONTRACT 208

OVERFLOW CONDUIT -  
PLAN & PROFILE OF DRAINAGE FILTER

SCALE AS INDICATED



HEADWALL FOR 12" DIA. PIPE - DETAIL  
NOT TO SCALE

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ENGINEERS, INC.**

DESIGNED RED DRAWN *[signature]* CHECKED *[signature]*  
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**WATER SYSTEM IMPROVEMENTS**  
**EARTHFILL DAM**  
CONTRACT 20B

PEAK NO. 4713

LITTLE CREEK

# LEGEND

ORIGINAL GROUND CONTOURS

FINAL GROUND CONTOURS & NEW STRUCTURES

HIGH POINT (H.P.) OF BERM

MARK

CONCRETE PAVED  
DOWN H.P.  
H.P. DETAIL  
6 2

E.D. ROAD - HIGHWAY  
ON DAM

ON H.P. ROAD - HIGHWAY  
ON DAM

SECT. AT  
ELEV. 100

NA. NO. 100

100

TYPE

PER

100

100

100

100

100

100

100

100

100

100

100

100

100

100

100

100

100

100

100

100

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100

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100

100

100

100

100

## PLAN

100'

INLET FRAME & GRATING

LOW POINT OF BERM

SLOPE FROM H.P. OF BERM

EMBED FITTINGS IN MORTAR

CONC. FILL

CONCRETE SLAB

CONCRETE FILL TO  
ELEVATION OF PIPE INVERTS

## SECTION

3  
6 6

8" CONCRETE BLOCK WALL  
CONCRETE

22 1/2" BERM

WALL FITTING

NOTE: WALL BERM  
NOT SHOWN

## PLAN

## SECTION

3  
6 6

## DRAIN INLET FOR BERMS - DETAIL

NOT TO SCALE

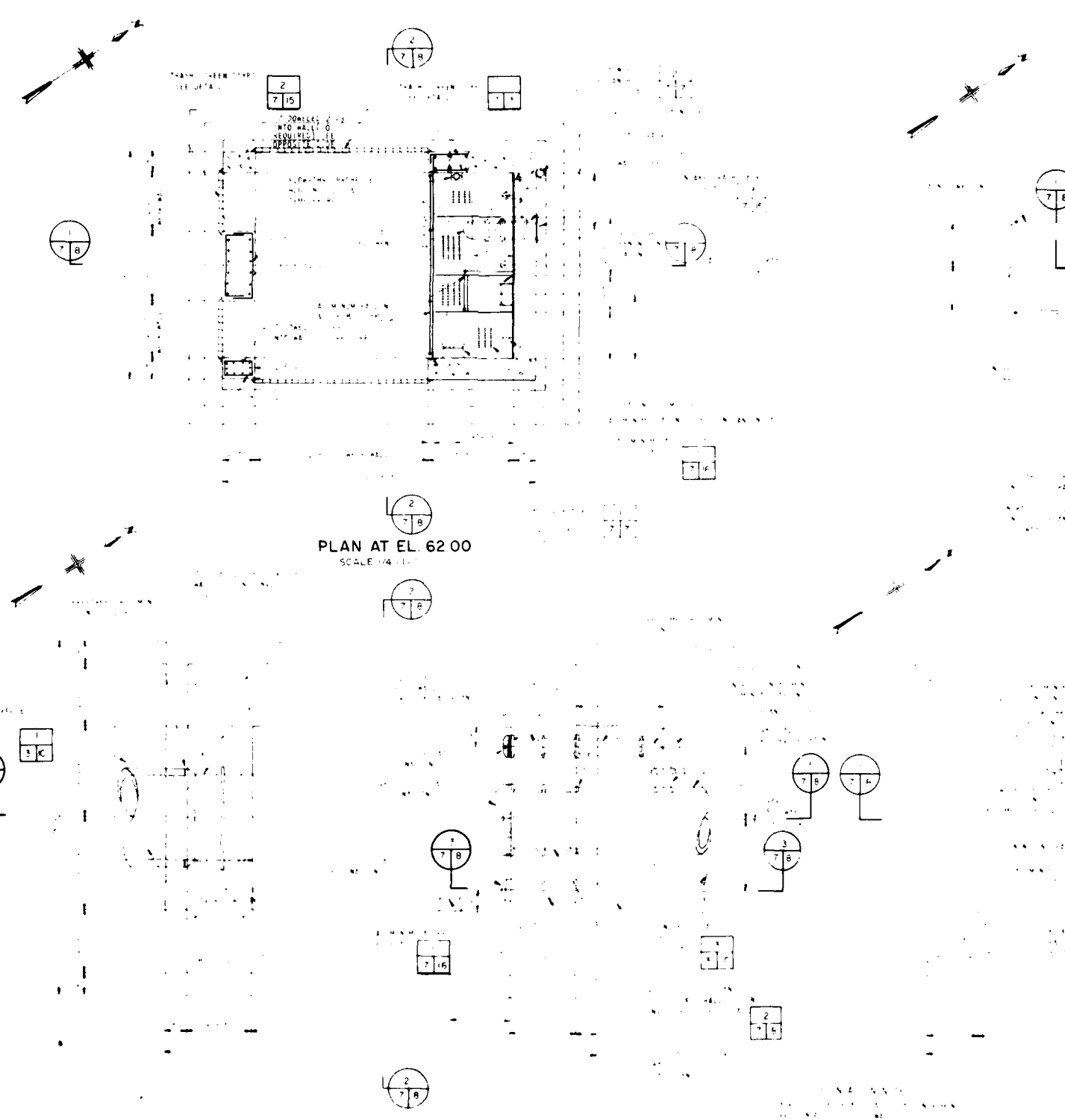
2  
4 6

## PLATE

3. VIRGINIA DEPARTMENT OF PUBLIC UTILITIES  
SYSTEM IMPROVEMENTS  
EARTHFILL DAM  
CONTRACT 20B

## DRAINAGE PLAN, PLANS, SECTIONS AND DETAILS

SCALE AS INDICATED



PLAN AT EL. 20.00  
SCALE 1/4" = 1'-0"

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EARTHFILL DAM**  
CONTRACT 20B



104 CONNECTION  
W/10078-1001 -  
SEE DETAIL

1  
14 14

WALL VENTILATION  
NOTICALLY DRAIN PIPE

LATENT

WALL VENTILATION

WALL VENTILATION

WALL VENTILATION

PLAN

SECTION

DETAIL

1  
H B

TRASH SCREEN

WALL VENTILATION



WALL VENTILATION

WALL VENTILATION

WALL VENTILATION

WALL VENTILATION

WALL VENTILATION

CONNECTION OF RAIL W/10078-1001 -  
TO BEAM TOP - SEE DETAIL

2  
B C

APPROXIMATE LOCATION  
GROUND SURFACE - TOP

WALL VENTILATION

WALL VENTILATION

WALL VENTILATION

WALL FITTING-DETAIL  
NOT TO SCALE

1  
H B

SECTION 2  
SCALE 3/16"=1'-0"

SECTION 3  
SCALE 3/16"=1'-0"

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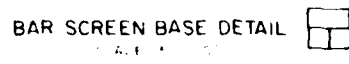
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CHECKED

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WATER SYSTEM IMPROVEMENT  
EARTHFILL DAM  
CONTRACT 20B





PLAN  
SCALE 1/4" = 1'-0"

CONCRETE CRADLE  
TYPE B  
SEE DETAIL



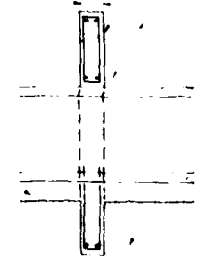
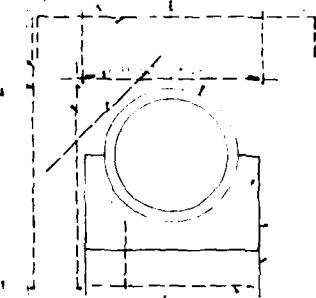
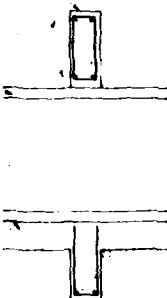
SECTION  
SCALE 1/4" = 1'-0"

SECTION  
SCALE 1/4" = 1'-0"

INLET STRUCTURE

CONCRETE CRADLE  
OVERFLOW CRADLE

CONCRETE CRADLE



SECTION  
SCALE 1/4" = 1'-0"

SECTION  
SCALE 1/4" = 1'-0"

TYPE A  
CUTOFF COLLAR & CRADLE-DETAIL  
SCALE 1/4" = 1'-0"



TYPE B  
CUTOFF COLLAR & CRADLE-DETAIL  
SCALE 1/4" = 1'-0"

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REVISIONS

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**WATER SYSTEM IMPROVEMENTS**  
**EARTHFILL DAM**  
CONTRACT 208

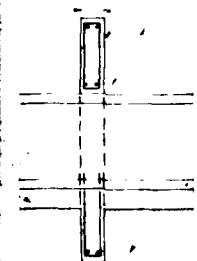


BAR SCREEN BASE DETAIL  
SCALE 3/8"=1'-0"



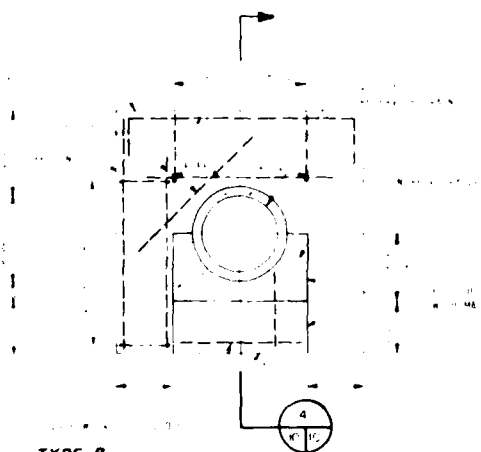
SECTION 2  
SCALE 1/4"=1'-0"

STRUCTURE



SECTION 4  
SCALE 1/4"=1'-0"

TYPE B  
CUTOFF COLLAR & CRADLE - DETAIL  
SCALE 1/4"=1'-0"

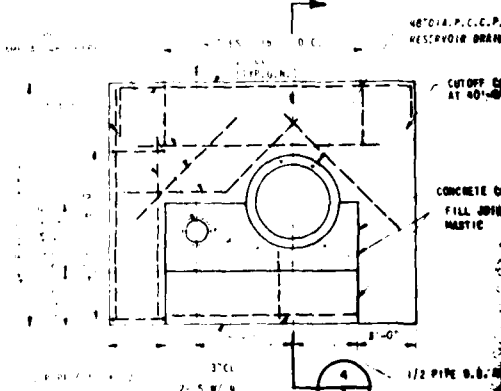


SECTION 2  
SCALE 1/4"=1'-0"

PLAN  
HEADWALL FOR DRAINAGE FILTER OUTLET  
SCALE 3/8"=1'-0"



DRAINAGE FILTER - DETAIL  
SCALE 3/8"=1'-0"



TYPE C  
CUTOFF COLLAR & CRADLE - DETAIL  
SCALE 1/4"=1'-0"

SECTION 4  
SCALE 1/4"=1'-0"

WISCONSIN DEPARTMENT OF PUBLIC UTILITIES  
SYSTEM IMPROVEMENTS  
EARTHFILL DAM  
CONTRACT 208

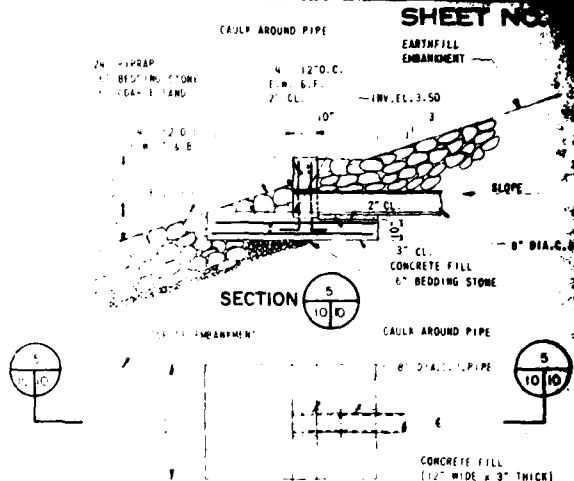
INLET PIPING & DRAINAGE FILTER  
PLANS, SECTIONS, AND DETAILS

SCALE AS INDICATED

DATE REVISION

REVISION

DATE REVISION



SECTION 5  
SCALE 1/4"=1'-0"

SECTION 5  
SCALE 1/4"=1'-0"

SHEET NO.

24" R. PRAP  
6" BEDDING STONE  
6" COARSE SAND



PLAN  
SCALE 1/4" = 1'-0"

24" R. PRAP  
6" BEDDING STONE  
6" COARSE SAND

NORMAL HIGH  
TIDE LEVEL  
ELEVATION

SECTION  
SCALE 1/4" = 1'-0"



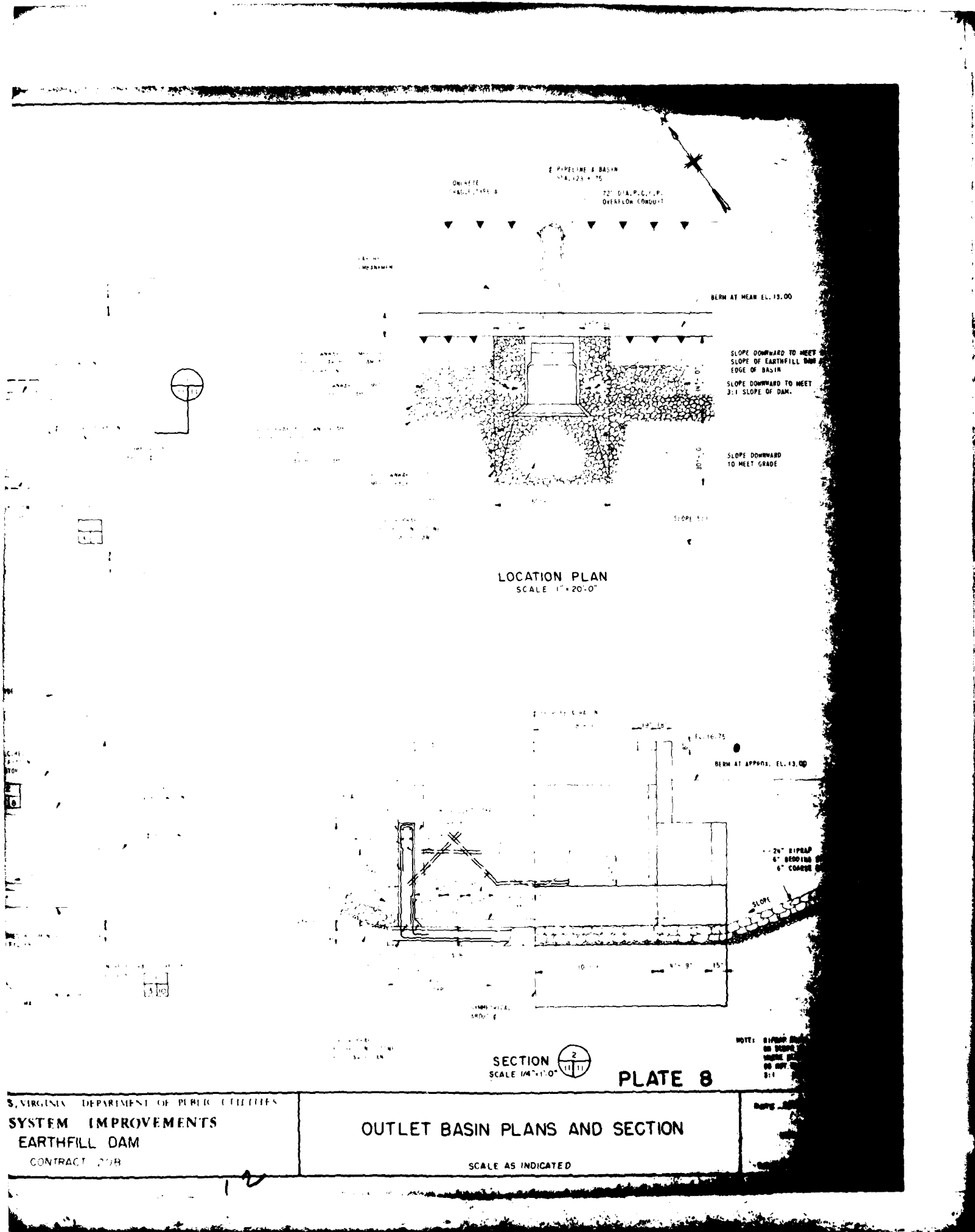
MALCOLM  
WHE  
ERS, INC.

DESIGNED RED  
REVISIONS

DRAWN

CHECKED J. B. B.

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WATER SYSTEM IMPROVEMENTS  
EARTHFILL DAM  
CONTRACT NO. 48



LOCATION PLAN  
SCALE 1"=20'-0"

SECTION 2  
SCALE 1/4"=1'-0"

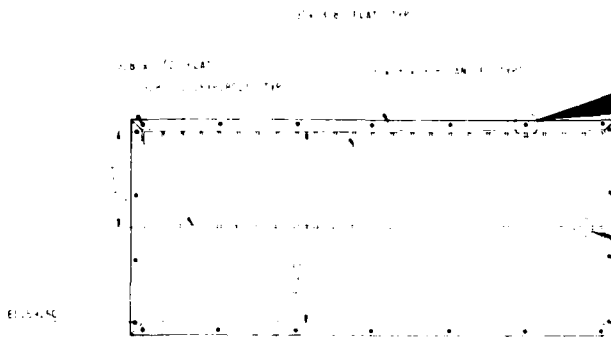
PLATE 8

S. VIRGINIA DEPARTMENT OF PUBLIC UTILITIES  
SYSTEM IMPROVEMENTS  
EARTHFILL DAM  
CONTRACT 208

OUTLET BASIN PLANS AND SECTION

SCALE AS INDICATED

NOTE: RIPRAP SHALL  
BE PLACED  
ON BOTH  
UPPER AND  
LOWER  
SLOPE



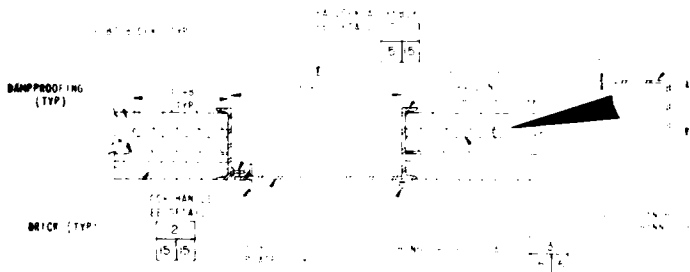
TRASH SCREEN - DETAIL

SCALE 1/2" = 1'-0"



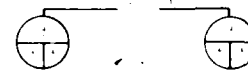
TRASH SCREEN - DETAIL

SCALE 1/2" = 1'-0"



SECTION

SCALE 3/4" = 1'-0"

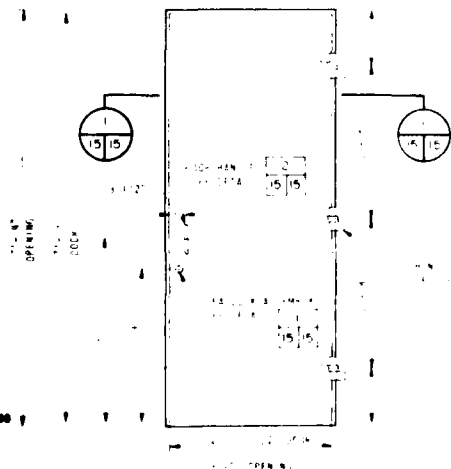


SECTION

SCALE 3/4" = 1'-0"



SECTION



STEEL PLATE DOOR - DETAIL

SCALE 1/4" = 1'-0"



DEADLOCK ASSEMBLY - DETAIL

SCALE 1/4" = 1'-0"



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DESIGNED: KES DRAWN: CHECKED: J.D.  
REVISIONS

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EARTHFILL DAM  
CONTRACT 20R

3/4" x 1/2" x 1/2" ANGLE

3/8" x 1/2" x 1/2" EXP. ROLL

3/4" x 1/2" x 1/2" ANGLE

3/4" x 1/2" x 1/2" ANGLE

3/4" x 1/2" x 1/2" ANGLE

3/8" x 1/2" x 1/2" EXP. ROLL (110)  
3/8" x 1/2" x 1/2" ANGLE (110)

NOTES: 1. ONE (1) OF THREE (3) SCREEN IS REQUIRED  
2. MAX. SPACING OF BOLTS TO BE 9" C.

# TRASH SCREEN-DETAIL

SCALE 1/2" = 1'-0"



# DOOR HANDLE DETAIL

NOT TO SCALE



# INTAKE TRASH SCREEN DETAIL

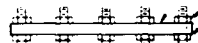
SCALE 1" = 1'-0"



BLIND FLANGE

TWO (2) S.S. BOLTS AT EACH END OF

1/2" DIA. x 18" LONG W/ 1/2" OF THREAD (110) (12 BOLTS)



FLANGED PIPE END

1/2" DIA. PIPE

# INTAKE PIPE-DETAIL

SCALE 1/2" = 1'-0"



CONCEALED BRICK FLEXIBLE FLANGE

BRICK

4" x 6" x 12"

4" x 3 1/2" x 12"

# SECTION

SCALE 6" = 1'-0"



# HINGE-DETAIL

SCALE 1/2" = 1'-0"



# SECTION

SCALE 1" = 1'-0"



1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

1/2" DIA. PIPE

DEPARTMENT OF PUBLIC UTILITIES

IMPROVEMENTS

DAM

20B

# MISCELLANEOUS SECTIONS AND DETAILS

SCALE AS INDICATED

TOP OF DAM PROFILE

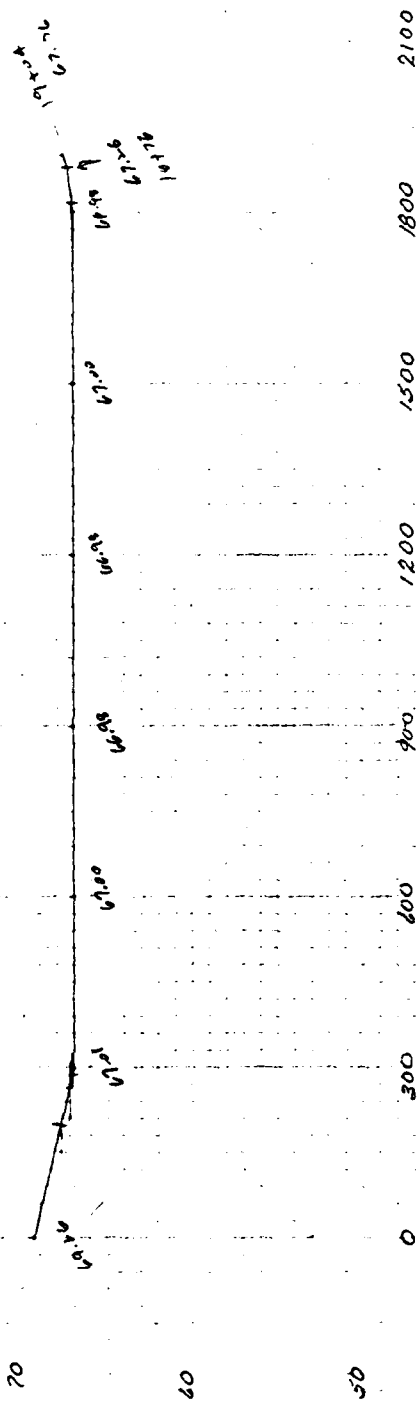


PLATE 10

CROSS SECTION THRU DAM

DAM CREST EL 67.0

70

60

50

40

30

20

10

▽

3.2H:1V

2.9H:1V

3H:1V

3H:1V

PLATE II

0

100

150

200

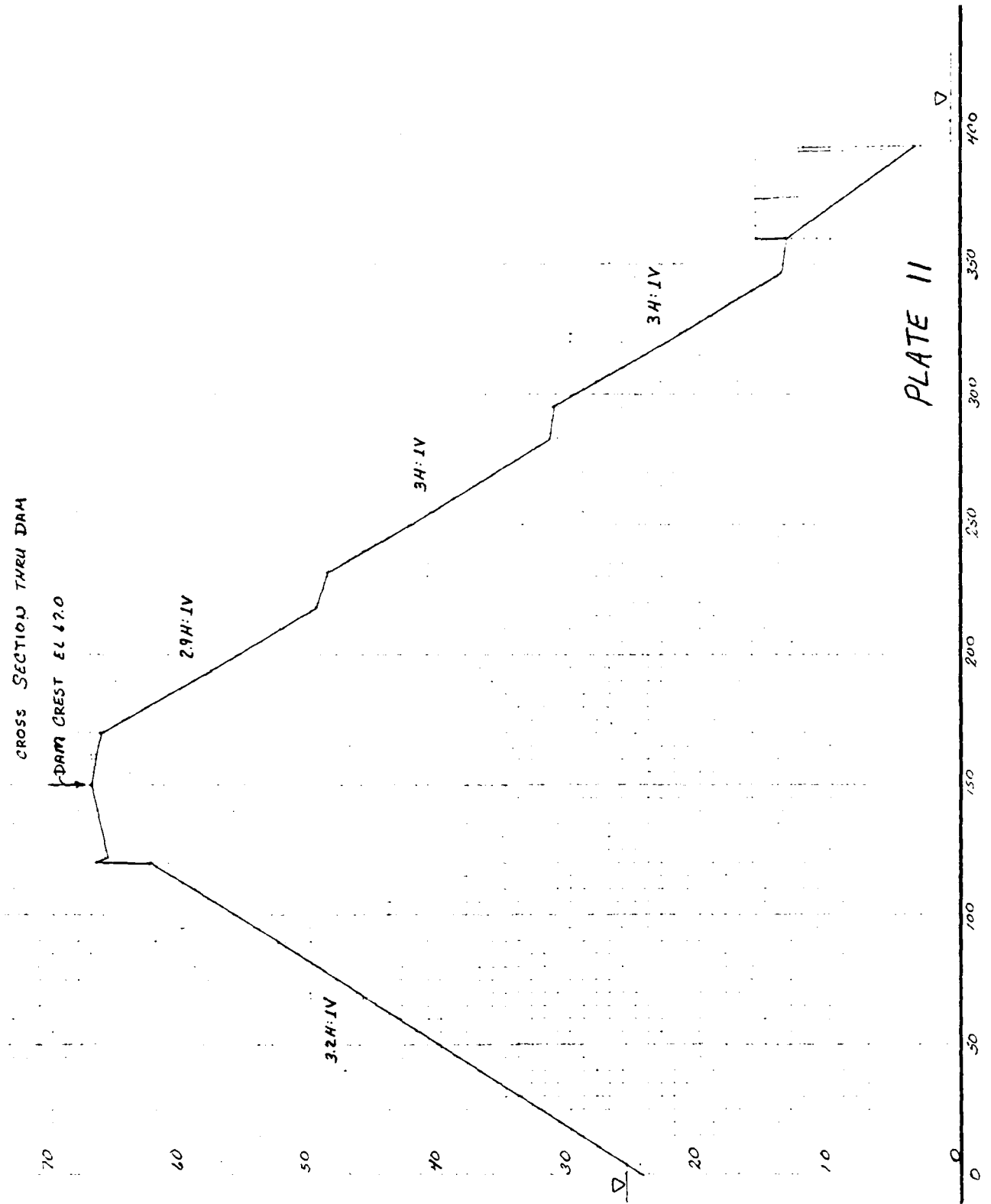
250

300

350

400

▽



APPENDIX II

PHOTOGRAPHS



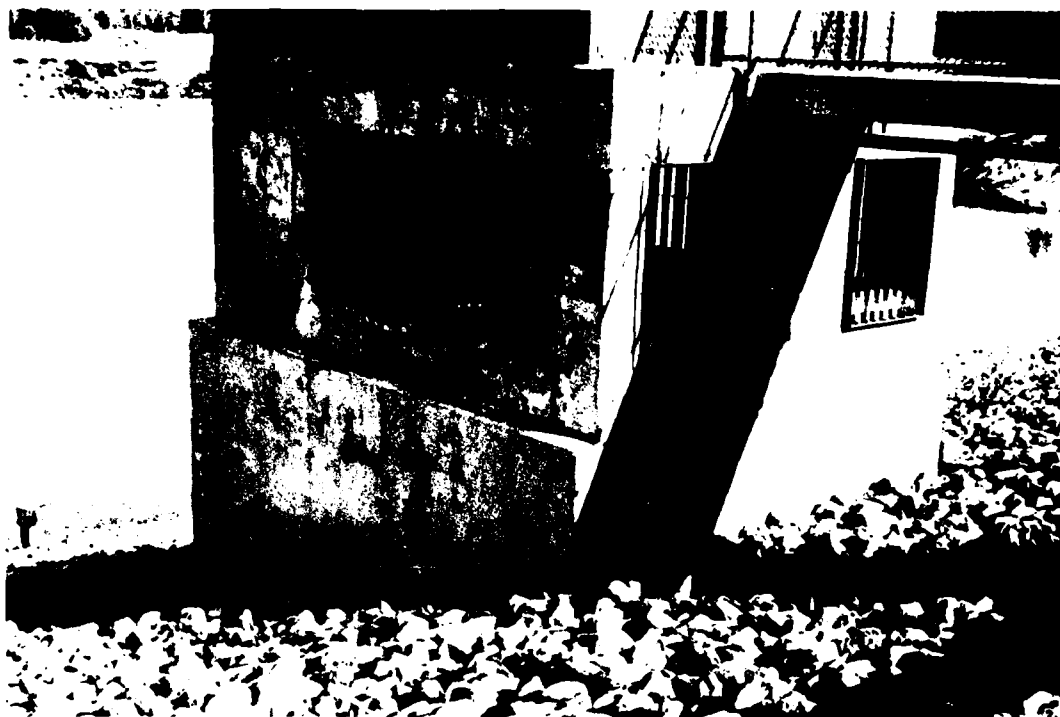
## CONTENTS

- Photo 1: Spillway Drop Inlet and 12-inch Intake Pipe
- Photo 2: Spillway Outlet Structure, Riprapped Toe of Dam
- Photo 3: Riprapped Upstream Embankment, Spillway Drop Inlet
- Photo 4: Sparse Grass Cover on Downstream Embankment
- Photo 5: Eroded Left Upstream Abutment
- Photo 6: Insufficient Riprap at Bottom of Left Downstream Concrete Chute
- Photo 7: Drainage Filter Outlet with Removable V-Notch Weir
- Photo 8: Downstream View from Crest of Dam, House Near Second Dock

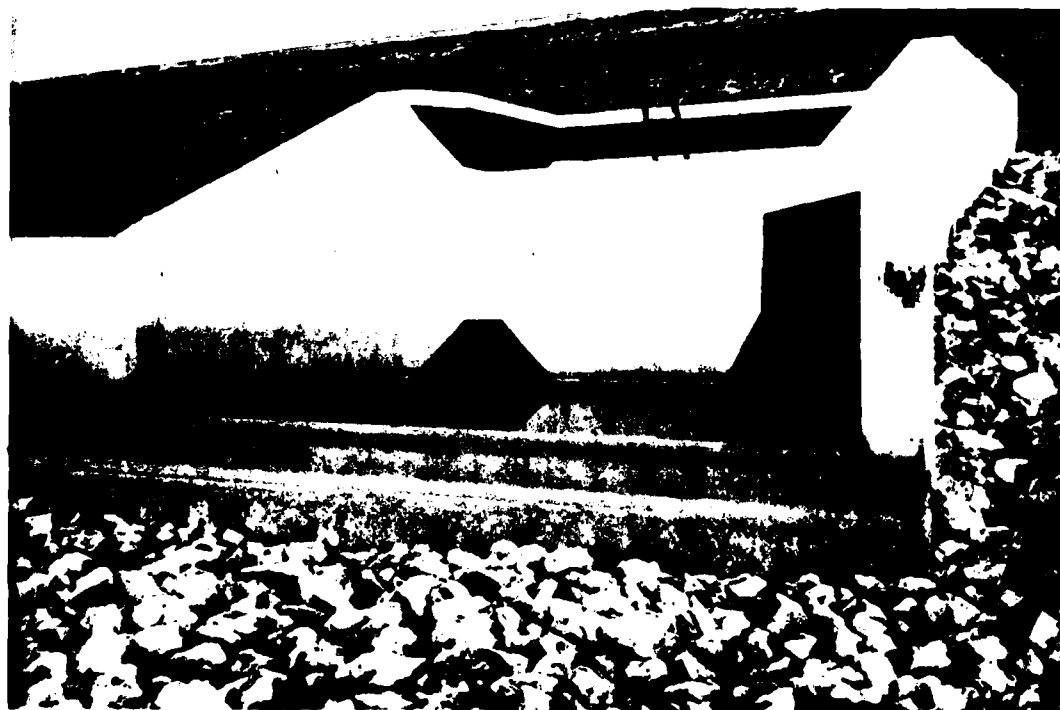
Note: Photographs were taken on 13 November 1980.

NAME OF DAM: LITTLE CREEK RESERVOIR DAM

# **LITTLE CREEK RESERVOIR DAM**



**PHOTO 1. Spillway Drop Inlet and 12-Inch Intake Pipe**



**PHOTO 2. Spillway Outlet Structure, Riprapped Toe of Dam**

## **LITTLE CREEK RESERVOIR DAM**



**PHOTO 3. Riprapped Upstream Embankment, Spillway Drop Inlet**

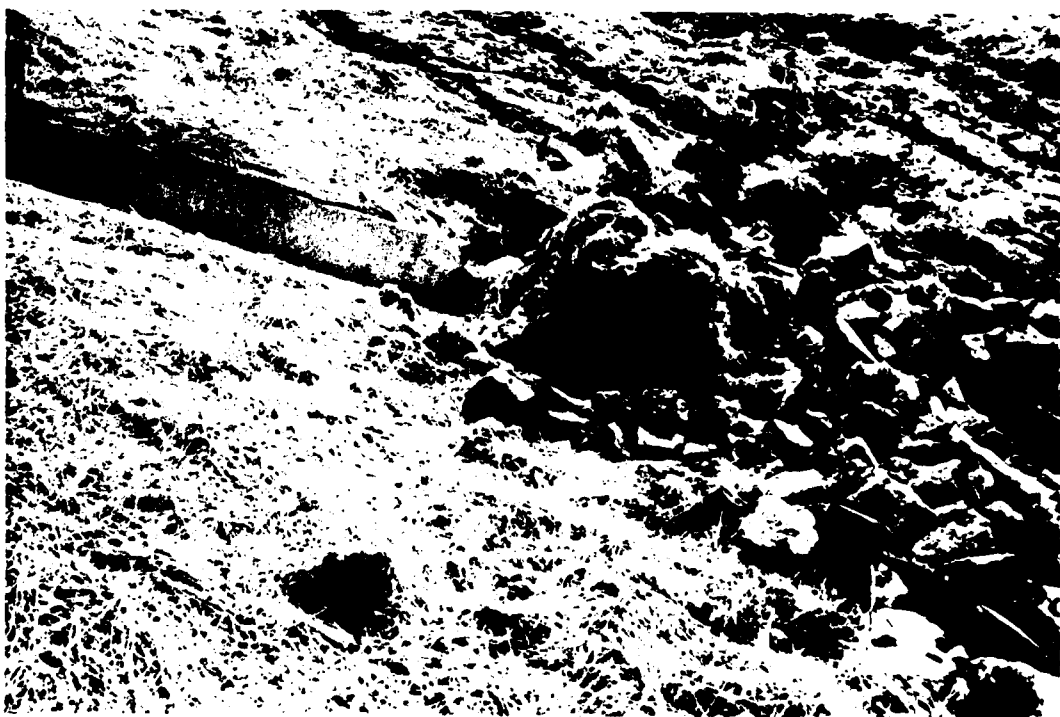


**PHOTO 4. Sparse Grass Cover on Downstream Embankment**

## **LITTLE CREEK RESERVOIR DAM**



**PHOTO 5. Eroded Left Upstream Abutment**



**PHOTO 6. Insufficient Riprap at Bottom of Left Downstream Concrete Chute**

**LITTLE CREEK RESERVOIR DAM**



**PHOTO 7. Drainage Filter Outlet with Removable V-Notch Weir**



**PHOTO 8. Downstream View from Crest of Dam, House Near Second Dock**

APPENDIX III  
VISUAL INSPECTION CHECK LIST

Check List  
Visual Inspection  
Phase 1

Name of Dam Little Creek County James City State Virginia Coordinates Lat. 3721.0  
Reservoir Long. 7650.5

Date of Inspection 13 November 1980 Weather Clear Temperature 65° F.

Pool Elevation at Time of Inspection 25.7 ft. 0.9 Tailwater at Time of Inspection 0.9 ft. 0.9 M.S.L. M.S.L.

Inspection Personnel:

Michael Baker, Jr., Inc.:

Jeffrey Quay  
H.P. Lim  
David Hupe

Virginia State Water Control Board:

Leon Musselwhite

Owner's Representatives:

Ed Lett

David Hupe Recorder

# EMBANKMENT

Name of Dam: LITTLE CREEK RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	<p>The downstream embankment is slightly eroded and covered with sparse grass. Local mulching and reseeding has been conducted recently. A very minor slump is located on the far right downstream embankment between the upper and middle benches. The upstream side of the left abutment is badly eroded; however, most of this area will be inundated when the reservoir reaches normal pool level.</p>	<p>A good grass cover should be established over the entire embankment. A good vegetative cover will be sufficient to stabilize the minor slump.</p>



# EMBANKMENT

Name of Dam: LITTLE CREEK RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Horizontal and vertical alignment of the crest are both very good.	
RIPRAP FAILURES	The upstream embankment is completely covered with riprap. Riprap has also been placed along the entire downstream toe of the embankment to provide erosion protection during periods of high tailwater. The riprap consists of angular rocks approximately 1 ft. in diameter. All riprap was in good condition.	

# EMBANKMENT

Name of Dam: LITTLE CREEK RESERVOIR

VISUAL EXAMINATION OF		OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM		All four junctions of the embankment with the abutments contain paved concrete chutes. The left upstream abutment is badly eroded below the chute. Jute matting has been used in the area of the chutes on the downstream side of the dam to prevent erosion while vegetation is being established. There is no emergency spillway.	Additional riprap is needed at the base of the chute draining the junction of the downstream embankment with the left abutment. The erosion on the left upstream abutment will be inundated and should not require remedial treatment.
ANY NOTICEABLE SEEPAGE		No seeps or wet spots were found.	The reservoir is being filled for the first time. During the inspection, the reservoir was more than 30 ft. below normal pool.
STAFF GAGE AND RECORDER	None		A staff gage should be installed to monitor reservoir levels above normal pool.
DRAINS		There are three 8 in. diameter drainage filter outlets along the downstream toe, one to the left and two to the right of the spillway outlet. There was flow from all three.  There are two 12 in. bench drain outlets	Removable 2 in. deep V-notch weirs are present in the drainage filter outlets. Weir measurements during inspection:

# EMBANKMENT

Name of Dam: LITTLE CREEK RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
DRAINS (continued)	left of the spillway outlet and three to the right. There was no flow from any of these.	<p>Left outlet - 1007 (units unknown)            Middle outlet - 177            Right outlet - 1275</p> <p>A regular observation program should be established to monitor discharges.</p>

# OUTLET WORKS

Name of Dam: LITTLE CREEK RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	The outlet conduit, a 6 ft. diameter reinforced concrete pipe, is in good condition, with no cracking or spalling.	
INTAKE STRUCTURE	The intake structure is a rectangular reinforced concrete riser with interior dimensions 13 ft. by 18 ft. There are two 12 ft. long and two 4 ft. long inlets at elevation 60.0 ft. M.S.L. All four inlets are covered with adequate trash racks. The concrete on the intake structure is in good condition.	
OUTLET STRUCTURE	The outlet consists of a 6 ft. diameter reinforced concrete pipe. The pipe discharges into a concrete impact basin. Flow is directed against a concrete baffle with two roughly-triangular openings for energy dissipation and then over a 30 ft. wide end sill. The outlet area is well riprapped. The outlet structure is in good condition.	
OUTLET CHANNEL	The outlet channel is heavily riprapped below the outlet structure. It is a wide, unobstructed valley.	
EMERGENCY GATE	The reservoir can be drawn down by means of a 48 in. diameter sluice gate set in the upstream wall of the riser. A 48 in. diameter reinforced concrete pipe leads from the sluice gate to the drain intake structure. There is a 12 in. diameter sluice gate that is tapped off the 48 in. diameter pipe.	

# OUTLET WORKS

Name of Dam: LITTLE CREEK RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
EMERGENCY GATE (continued)	There are two additional 12 in. diameter sluice gates, at elevations 30.0 and 48.0 ft. M.S.L. All gates are in good condition.	

UNGATED SPILLWAY

Name of Dam: LITTLE CREEK RESERVOIR

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
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CONCRETE WEIR	Not applicable - there is no emergency spillway.	
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APPROACH CHANNEL

DISCHARGE CHANNEL

BRIDGE AND PIERS

# INSTRUMENTATION

Name of Dam: LITTLE CREEK RESERVOIR

<u>VISUAL EXAMINATION</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
<b>MONUMENTATION/SURVEYS</b>	No permanent markers were found.	
<b>OBSERVATION WELLS</b>	<p>There are single observation wells located near the center of the dam on the upstream and downstream edges of the crest, and on the upper and middle benches of the downstream embankment. A total of 4 wells was found. Measurements during inspection:</p> <p>Well on crest:  upstream side - 57.95 ft. to water  downstream side - 58.3 ft. deep, no water</p> <p>Well on downstream embankment:  upper bench - 41.6 ft. to water  middle bench - 23.35 ft. to water</p>	A regular monitoring program should be established.
<b>WEIRS</b>	There are removable V-notch weirs in the drainage filter outlets.	A regular monitoring program should be established.
<b>PIEZOMETERS</b>	None	
<b>OTHER</b>	None	

# RESERVOIR

Name of Dam: LITTLE CREEK RESERVOIR

VISUAL EXAMINATION OF		OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES		The area upstream of the dam has been cleared and grubbed to an elevation several feet above the normal pool elevation. Moderate to severe erosion is occurring in the cleared areas. Beyond the limits of the clearing and grubbing, the reservoir slopes are wooded, with no evidence of erosion.	
SEDIMENTATION		Erosion of the lower reservoir slopes is causing some sedimentation to occur.	Sedimentation will be greatly reduced when the normal pool elevation is reached.



Name of Dam: LITTLE CREEK RESERVOIR      DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF		OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)		The downstream channel is wide and unobstructed. The stream is subject to tidal influences immediately downstream of the dam. The Chickahominy River is approximately 3 mi. downstream of the dam.	
	SLOPES	There is no appreciable slope to the downstream channel. The overbank areas are covered with tall grass, reeds, and brush.	
APPROXIMATE NO. OF HOMES AND POPULATION		There is one house approximately 900 ft. downstream of the dam and another approximately 4600 ft. downstream of the dam. Total population is estimated as eight.	

APPENDIX IV  
GENERAL REFERENCES

## GENERAL REFERENCES

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NAME OF DAM: LITTLE CREEK RESERVOIR DAM

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NAME OF DAM: LITTLE CREEK RESERVOIR DAM

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